

Using the ACS Journals Search to Validate Assumptions about Writing in Chemistry and Improve Chemistry Writing Instruction

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Supplemental Material

Included here are examples of classroom activities that address the following writing-related issues:

1. Nominalizations
2. Active and passive voice
3. Personal pronouns (*We*)
4. Words to avoid
5. Word to use
6. Confusing word pairs
7. Confusing plurals

We also include sample tasks that guide students in using the ACS Journals Search (<http://pubs.acs.org/journals>) to discover conventions of chemistry writing on their own.

Note: Suggested answers for these sample tasks are included at the end of each section.

Nominalizations (1 activity)

1. Consider the following two sentences taken from the chemistry literature. Underline instances of common nominalizations in each sentence and then rewrite sentence (b) without nominalizations. How does the revised sentence compare to the original in terms of clarity and conciseness?

Example: Potential conversion of the N1 adduct to its N⁶ derivative was made possible through a Dimroth rearrangement, although the efficiency of this process is highly dependent on reaction conditions and adduct structure (Scheme 2).²⁶ (1)

- (a) The electronic spectra and structure of these systems clearly relate to the presence of closed-shell metal-metal bonding,^{8,9} exciplex formation,¹⁰ electron transfer,¹¹ energy transfer,¹²⁻¹⁴ and chemical reactivity.¹⁵ (2)
- (b) The relative intensity of this signal permits a comparison of the strength of the interaction between oxides in dependence on the preparation conditions (milling time, calcination temperature and time, presence or absence of water). (3)

Suggested Answers

- 1(a) The electronic spectra and structure of these systems clearly relate to the presence of closed-shell metal-metal bonding,^{8,9} exciplex formation,¹⁰ electron transfer,¹¹ energy transfer,¹²⁻¹⁴ and chemical reactivity.¹⁵
- 1(b) The relative intensity of this signal permits a comparison of the strength of the interaction between oxides in dependence on the preparation conditions (milling time, calcination temperature and time, presence or absence of water).

Possible rewrite without nominalizations:

How intense this signal is permits one to compare how strongly the oxides interact and how the way they interact depends on the conditions under which the oxides were prepared (milling time, calcining temperature and time, and whether water was present or not). (*43 words compared to 34 words in original*)

Active and Passive Voice (3 activities)

- Rewrite these sentences so that they are more appropriate for the Methods section of a journal article. In each case, use passive voice and past tense. Also reword sentences to make them more concise and appropriate for an expert audience.
 - We measured the temperature with a K-type thermocouple located just above the catalyst bed.
 - Filter the precipitate. Wash three times with 10 mL of ethanol each time.
 - We carefully recrystallized the product from ethanol in a fume hood.
 - Add chlorosulfonic acid (0.350 mL) dropwise to a flask containing acetic acid in an ice bath.
 - We collected all of our samples in amber glass bottles with Teflon-lined caps (EPA level 1, 33 mm, VWR).
 - After much debate, we decided to use the Box-Hunter program run under MAPLE computer algebra software (v. 5, Waterloo Maple, Inc.).
- Rewrite the following synthetic procedure (4) using language appropriate for a journal article. The five steps listed (a–e) are from a single procedure involving multiple steps. Note the use of bolded numbers in (d) and (e).
 - Make a solution containing 15 mmol (3.60 g) of 2-(bromomethyl)-1-((4-methylphenyl)methyl)aziridine in 50 milliliters of acetonitrile.
 - Add 2.56 g (15 mmol) of benzyl bromide.
 - Heat the solution for 5 hours, refluxing.
 - Remove the solvent using a vacuum to produce *N*-benzyl-*N*-(2,3-dibromopropyl)-*N*-((4-methylphenyl)methyl)amine **4**.
 -

- (e) Purify the crude product using column chromatography on silica gel, eluting with a mixture of hexane and ethyl acetate. A typical yield of purified **4** is 85%.
3. Rewrite the following sentences without mentioning names or article/book titles. How many fewer words are needed? Does the conciseness aid or detract from the readability of the sentences?
- (a) Molnar et al. (17) were among the first scientists to point out that remarkable bioavailability-enhancing properties are exhibited by RAMEB in hydrocarbon-polluted soils. (5) (24 words)
- (b) Fatty foods, as first suggested by the researchers Gallo et al.⁵, are widely recognized as a main source of intake of toxic chemicals such as PCBs. (6) (26 words)
- (c) Reichardt,¹¹ in his important book entitled *Solvents and Solvent Effects in Organic Chemistry*, asserted that water has extraordinary physical properties as a solvent, making its use as a solvent widely appreciated. (7) (31 words)

Suggested Answers

- 1(a) The temperature was measured with a K-type thermocouple located just above the catalyst bed.
- 1(b) The precipitate was filtered and washed with ethanol (3 x 10 mL).
- 1(c) The product was recrystallized from ethanol.
- 1(d) Chlorosulfonic acid (0.350 mL) was added dropwise to acetic acid in an ice bath.
- 1(e) Samples were collected in amber glass bottles with Teflon-lined caps (EPA Level 1, VWR).
- 1(f) Data were analyzed using the Box-Hunter program in MAPLE (v. 5, Waterloo Maple, Inc.).
2. Answers may vary; below is one possible answer.

To a solution of 2-(bromomethyl)-1-((4-methylphenyl)methyl)aziridine (15 mmol, 3.60 g) in acetonitrile (50 mL) was added 2.56 g (15 mmol) benzyl bromide. After refluxing for 5 h, the solvent was removed under vacuum to produce *N*-benzyl-*N*-(2,3-dibromopropyl)-*N*-((4-methylphenyl)methyl)amine **4**. Purification by silica gel column chromatography (hexane/ethyl acetate) produced **4** in 85% yield.

3. Answers may vary; the following represent possible rewrites. In each case, conciseness makes the sentences more readable.

- (a) Remarkable bioavailability-enhancing properties are exhibited by RAMEB in hydrocarbon-polluted soils (17). (12 words, 12 fewer words than prompt)

RAMEB exhibits remarkable bioavailability-enhancing properties in hydrocarbon-polluted soils (17). (10 words, 14 fewer words than prompt)

- (b) Fatty foods are widely recognized as a main source of intake of toxic chemicals such as PCBs.⁵ (17 words, 9 fewer words than prompt)
- (c) Water has extraordinary physical properties, making its use as a solvent widely appreciated.¹¹ (13 words, 18 fewer words than prompt)

Personal Pronouns (*We*) (2 activities)

1. Consider the most compelling reasons for using *we* in a Results section. For each passage below, decide whether the use of *we* is appropriate. Explain each decision.
 - (a) The results for the As and Pb concentrations **we** obtained for the 83 samples are reported in Table 3. **We** note from Table 3 that the range of As and Pb concentrations in the two populations is quite distinct.
 - (b) **We** use the term K_D , the distribution coefficient, in the following discussion, although equilibrium may not have been achieved in all cases.
 - (c) To reduce the problems of ligand-specific bias, **we** developed a modified rating for each molecule. **We** have called this corrected score the multiple active site correction rating (MASC).
 - (d) Within the reference group, **we** found that the mean oxidative damage for smokers was significantly higher than that for nonsmokers.
 - (e) At the end of each experiment, **we** measured the release of adsorbed alkenes from air-water interfaces.
2. Table 2 (in the accompanying *JCE* article) lists common phrases used in an Introduction to transition to the current work. Select two or three journals of your choice; browse through the Introductions in these journals until you find three new ways to introduce the current work. Remember that you will most often see these phrases toward the end of the Introduction. Add these new phrases to Table 2 to make it more complete.

Suggested Answers

- 1(a) Inappropriate use of *we*. The sentences present results and make reference to a table; *we* is not often used in such circumstances. In the results section, data are to be presented as objectively as possible, without drawing attention to researchers. References to graphics (tables, figures, schemes) are typically made without mentioning researchers, for example,

Table 1 shows . . .
. . . . as shown in Table 1.
. . . (Table 1).

- 1(b) Appropriate use of *we*. The sentence describes a decision or choice made by the authors.
- 1(c) Appropriate use of *we* in both sentences, though its use is not necessary. *We* is used to highlight a decision or choice made during the course of the work.
- 1(d) Inappropriate use of *we*. The sentence presents results, which should be introduced as objectively as possible, without reference to researchers.
- 1(e) Inappropriate use of *we*. The sentence describes work done in the past (procedures), typically written in past tense/passive voice, without reference to researchers.
2. Answers will vary. The students may observe phrases similar to the following:

This study (shows, has shown, showed) . . .
The objective of the present study (is, has been, was) . . .
This paper (presents) an investigation of . . .
This paper (focuses) on . . .
We (evaluate) here a new approach . . .
This article (addresses) . . .
We now (describe) . . .

Words to Avoid (1 activity)

1. Replace the informal verbs **bolded** in sentences (a)–(e) with more formal verbs (from the list below) to increase the formality of each sentence. You may need to change the form of verb so that the sentence remains grammatically correct. There may be more than one possible answer.

accumulate	discover	extract	reduce
analyze	eliminate	imply	remove
conduct	enable	include	report
conserve	ensure	investigate	suggest
consider	enter	limit	utilize
decrease	establish	obtain	withdraw
determine	examine	originate	

- (a) Because of its anticipated easy removal via catalytic hydrogenolysis, we decided to **look into** the application of (*R*)-phenylglycine amide as a chiral auxiliary in asymmetric synthesis.(8)
- (b) Cr³⁺ also increased DNA polymerase processivity and **cut down** its fidelity during DNA replication in vitro (15–17). (9)

- (c) Chromate may **go into** cells through the general anion channel, leading to rapid intracellular accumulation (10). (9)
- (d) Several countries have **set up** standards for PCBs in dietary products such as fish, meats, and eggs. (6)
- (e) During the study, it was **picked up** that Cr^{3+} influences DNA topology. (9)

Suggested Answers

- 1(a) investigate, examine, consider
- 1(b) decreased, reduced
- 1(c) enter
- 1(d) established
- 1(e) discovered, determined

Words to Use (5 activities)

1. Consider the passages below. Underline words that indicate that the authors are hedging, rather than offering “proof”.

Example: Our results suggest that Cr^{3+} has an impact on DNA, DNA topology, and consequently processes leading to cell growth and proliferation. This could ultimately lead to the mutagenic and carcinogenic potential of Cr^{3+} . Because it is known that humans exposed to different Cr^{3+} species accumulate high levels of Cr^{3+} intracellularly (17), presented results may have an impact on human intake of Cr^{3+} as a nutrition additive. (9)

 - (a) A possible explanation for this effect can be attributed to an increased density and viscosity of the milk-NaOH phase when NaOH concentration increases. (6)
 - (b) In all cases, this factor has a positive effect and it appears to be of increasing importance as the degree of chlorination of the PCBs increases. (6)
 - (c) For the highly chlorinated PCBs, the two fibers tested seem to have similar performance, and this factor lacks statistical significance. (6)
 - (d) The results presented here suggest a new mechanism of toxicity for $\text{PM}_{2.5}$ based on sustained hydroxyl radical generation by the semiquinone radicals present in $\text{PM}_{2.5}$. Because a substantial fraction of the fine particles in the atmosphere arises from combustion sources (9), we believe the deleterious health effects associated with $\text{PM}_{2.5}$ can be at least partially ascribed to radicals associated with combustion-generated particulate matter. (10)
 - (e) By using zinc salts as catalysts, we showed that water can be used as the solvent despite the relative insolubility of the starting materials. This discovery should facilitate the preparation of tetrazoles in the laboratory. (7)
2. Find an article of your choice using the ACS Journals Search. Read over the article to identify at least five instances of hedging.

3. Read the following passage. Do the bolded terms serve the functions indicated in Table 4 (in the accompanying *JCE* article)? If not, what functions do they serve to create a cohesive passage?

Initially, SPME was used to analyze pollutants in water^{20,21} via direct extraction. **Subsequently**, SPME was applied to more complex matrixes, such as solid samples or biological fluids. With these types of samples, direct SPME is not recommended; **nevertheless**, the headspace mode (HSSPME) is an effective alternative to extracting volatile and semivolatile compounds from complex matrixes. (6)

4. Read the following passage. Two words (or phrases) are missing, indicated by the blanks. What words do you think the authors used? Does the inclusion of these words add a sense of fluency to the passage? Do they add clarity to the passage?

Laser ablation coupled to ion cyclotron resonance Fourier transform mass spectrometry (in both positive and negative ion modes) can be used to distinguish natural and artificial opals. In positive ion mode, species including hafnium and large amounts of zirconium atoms are found to be specific for artificial opal. _____, aluminum, titanium, iron, and rubidium are systematically detected in the study of natural opals. _____, some ions allow us to distinguish between natural opal from Australia and Mexico. Australian gemstones include specifically strontium, cesium, and barium. (11)

5. Browse through the Introductions of three different journal articles and find at least five examples of sentences that begin with a word or short phrase that serves one or more of the functions listed in Table 4 (in the accompanying *JCE* article).

Suggested Answers

- 1(a) A possible explanation for this effect can be attributed to an increased density and viscosity of the milk-NaOH phase when NaOH concentration increases.
- 1(b) In all cases, this factor has a positive effect and it appears to be of increasing importance as the degree of chlorination of the PCBs increases.
- 1(c) For the highly chlorinated PCBs, the two fibers tested seem to have similar performance, and this factor lacks statistical significance.
- 1(d) The results presented here suggest a new mechanism of toxicity for PM_{2.5} based on sustained hydroxyl radical generation by the semiquinone radicals present in PM_{2.5}. Because a substantial fraction of the fine particles in the atmosphere arises from combustion sources (9), the deleterious health effects associated with PM_{2.5} can be at least partially ascribed to radicals associated with combustion-generated particulate matter.

- 1(e) By using zinc salts as catalysts, we showed that water can be used as the solvent despite the relative insolubility of the starting materials. This discovery should facilitate the preparation of tetrazoles in the laboratory.
2. Answers will vary. Below are instances of hedging from Dellinger et al. (2001) and Demko and Sharpless (2001). Other forms of hedging would likely be found in other articles.

Examples from Dellinger, B.; Pryor, W. A.; Cueto, R.; Squadrito, G. L.; Hegde, V.; Deutsch, W. A. *Chem. Res. Toxicol.* **2001**, *14*, 1371–1377:

- Our body of data leads us to propose that the radical signals we report are also due to semiquinone-type radicals.
- The detection of these molecular species that are similar in structure to semiquinone-type radicals support the assignment of our EPR signals.
- The data shown in Figures 1–4 support the suggestion that PM_{2.5} contains radicals which, like those in cigarette tar, can reduce oxygen to superoxide, which then forms hydrogen peroxide and, ultimately, the hydroxyl radical, as shown in reactions 1–3.
- Iron and copper ions, which are the transition metals most frequently found in combustion-generated particles (44) and also are ubiquitous in biological systems, could be involved in reaction 3....
- Therefore, we propose that the radicals associated with PM_{2.5} include semiquinone-type radicals that, like the cigarette tar radical, can reduce oxygen to produce superoxide and ultimately produce the DNA-damaging hydroxyl radical.

Example from Demko, Z. P.; Sharpless, K. B. *J. Org. Chem.* **2001**, *66*, 7945–7950:

- Our mechanistic studies to date imply that the role of zinc is not simply that of a Lewis acid; a number of other Lewis acids were tested and caused little to no acceleration of the reaction.²³
 - One might expect a small amount of hydrazoic acid to be liberated during the reaction at the temperatures and concentrations involved.
 - Presumably, this acceleration is due to a combination of the substituents' intramolecular hydrogen bonding and σ -electronic effects.
3. The underlined terms do serve the functions indicated in Table 4: “Initially” and “Subsequently” both signal time, and “nevertheless” shows contrast.

4. The first blank should be filled with a word or phrase that shows a contrast (e.g., On the other hand, In contrast). The second blank should be filled with a word or phrase that signals additional information (e.g., Moreover, Furthermore). Yes, including these phrases in the blanks adds fluency and clarity to the passage.
5. Answers will vary. Below are example sentences that begin with a word or short phrase that serves one or more of the functions in Table 4. An examination of other articles would likely reveal other words/phrases.

From Murahashi, T.; Nakashima, H.; Nagai, T.; Mino, Y.; Okuno, T.; Jalil, M. A.; Kurosawa, H. *J. Am. Chem. Soc.* **2006**, *128*, 4377–4388.

- Historically, the interaction between metal-metal bonded species and olefin has received considerable attention as models for adsorption/desorption on metal surfaces.^{8,9} (Historically: to signal time)
- Typically, $\text{Mn}_2(\text{CO})_{10}$ reacts with 1,3-butadiene or 1,3,5-hexatriene under the irradiation condition to form (Typically: to describe a typical case)
- At present, involvement of inter-series isomerization makes the evaluation of the stereo-chemistry of the dinuclear addition process involving **1** and 1,3,5-trienes difficult.^{32b} (At present: to signal time)

From Mehinagic E.; Royer, G.; Symoneaux, R.; Jourjon, F.; Prost, C. *J. Agric. Food Chem.* **2006**, *54*, 2678–2687.

- In general, apple fruit maturation is a period defined by physiological and structural changes. (In general: to describe a typical case)
- In fact, the volatile compounds produced by apples have been studied for over 50 years, and over 200 volatile compounds have been found in different apple cultivars (*12*). (In fact: to add emphasis or clarify)
- Thus, butyl acetate, 2-methylbutyl acetate, hexyl acetate, and hexyl hexanoate have been identified as being responsible for the overall apple aroma in several cultivars (*14*, *16*). (Thus: to show case and effect)
- To date, no work has been published on the comparison of odorant volatile composition in different cultivars, . . . (To date: to signal time)

From Dreuw, A. *J. Phys. Chem. A* **2006**, *110*, 4592–4599.

- In addition, it has been shown that xanthophylls violaxanthin (Vio) and zeaxanthin (Zea) (Figure 1) are key players in a protection mechanism against excess excitation energy . . . (In addition: to provide additional information)
- Remarkably, almost all reported values are clearly below the Q_y state of Chl *a* (1.84 eV), thus arguing against the proposed molecular “gear-shift” model. (Remarkably: to add emphasis)

Confusing Word Pairs (2 activities)

1. Identify the incorrect uses of **comprise** and make corrections as needed.
 - (a) The Na^+ or K^+ cation interaction has been experimentally probed by using synthetic receptors that **comprise** diaza-18-crown-6 lariat ethers having ethylene sidearms attached to aromatic donors. (12)
 - (b) The photoelectrons with energies from 0 to 0.20 eV are **comprised** of the third region, corresponding to dissociation. (13)
 - (c) The capsid's scaffolding is **comprised** of 103 assembly protein (AP) molecules. (14)
2. Fill in the blanks with the correct word(s): **principle, in principle, principles, or principal**.
 - (a) In the most favorable case, this can lead to a balanced treatment of these states, but more accurate calculations are, _____, needed to corroborate this assumption. (15)
 - (b) **Table 1.** _____ characteristics of three apple cultivars harvested at three commercial maturity stages. (16)
 - (c) From the viewpoint of the microscopic reversibility _____, elimination of a Pd-Pd bonded moiety from the dipalladium(II) complexes is of great interest in relation to the dinuclear addition reactions discussed above. (17)

Suggested Answers

- 1(a) Correct as is.
 - 1(b) are composed of; comprise
 - 1(c) is composed of; comprises
- 2(a) in principle
 - 2(b) Principal
 - 2(c) principle

Confusing Word Plurals (1 activity)

1. The sentences below are taken from student papers. For each one, decide whether the correct verb form is used; make corrections if they are needed. If the sentence is correct, indicate "Correct as is".
 - (a) The data does not seem to suggest a practical application of the equation.
 - (b) The data included in these tables are only those necessary for the calculation.
 - (c) Hatakiyama et al.³ note that forensic toxicological analyses has increased in the past decade.
 - (d) Elemental analyses were performed by Detroit Laboratories.
 - (e) Our analysis of the reaction rate coefficients suggest that the product is formed through an S_N2 mechanism.
 - (f) Spectra were collected in triplicate.
 - (g) FT-Raman spectra, collected in triplicate, was obtained using a Nicolet 870 spectrometer.
 - (h) The synthesis of tetrazole proceed through a one-step concerted mechanism.

Suggested Answers

- 1(a) do [instead of *does*]
- 1(b) Correct as is.
- 1(c) *note* correct as is; have [instead of *has*]
- 1(d) Correct as is.
- 1(e) suggests [instead of *suggest*]
- 1(f) Correct as is.
- 1(g) were [instead of *was*]
- 1(h) proceeds [instead of *proceed*]

Student Consultation of the ACS Journals Search (<http://pubs.acs.org>) (3 activities)

1. Choose a journal of interest to you using the ACS Journals Search. Search for the words *table* and *figure*. Examine at least five articles to determine how the words are used.

- (a) Where are the words *table* and *figure* placed in the table and figure, respectively?
 - (b) How are the words formatted in the title or caption?
 - (c) How are the words formatted in the text (with respect to capitalization, bolding, and abbreviations)?
 - (d) Identify at least three ways in which you can refer to a table or figure in the body of your text.
2. Fourier transform infrared (FTIR) spectroscopy, gas chromatography (GC), and mass spectrometry (MS) are three commonly used techniques in chemical research. Typically, such techniques are performed on commercial instruments. How should you describe such instruments in your paper? The ACS Journals Search can help you answer this question, particularly if you know the vendor and model number of your instrument. To practice this skill, do the following:
- (a) Imagine you are collecting FTIR spectra with a Bruker Equinox 55 spectrophotometer. Using the ACS Journals Search, find two journal articles that describe this instrument in the Experimental section. What details are included about the instrument? Do the authors include a sketch of the instrument? Why or why not?

Hint: Put quotation marks around the name of the instrument when you do your search (e.g., "Bruker Equinox 55"), and sort your "hits" by date, to view the most recent publications first.
 - (b) Repeat 2(a) for a "Varian CP-2800" gas chromatograph (which is generally coupled to a mass detector or mass spectrometer).
3. Consult The ACS Journals Search. Find out
- (a) if the following word is spelled correctly: carboiimide
 - (b) how "cis" and "trans" should be formatted (i.e., bolded, underlined, italicized, regular)
 - (c) if the word Salmonella should be capitalized and italicized

Suggested Answers

Note: Our answers are true for many but not all ACS journals; hence, student answers may vary. Also, the answers are based on how the text appears in pdf format, not html format.

- 1(a) Table titles are placed above the table and figure captions are placed below the figure.

- 1(b) In figures, the word “figure” and its number are bolded, the letter “F” is capitalized, and a period (also bolded) is placed after the number. The caption is typically left-justified, unbolded, in sentence case, and ends with a period, e.g.,

Figure 1. Atom-by-atom superposition used for 3D-QSAR analysis.

In tables, the word “table” and its number are bolded, the letter “T” is capitalized, and a period (also bolded) is placed after the number. In some journals, the table title is written in sentence case, left-justified, and ends with a period. In other journals, the table title is written in title case, centered, and ends without a period. Both conventions are illustrated below.

Table 1. Germination stimulation activity of strigolactones identified in tobacco root exudates.

Table 1. Germination Stimulation Activity of Strigolactones Identified in Tobacco Root Exudates

- 1(c) In the text, the words “table” and “figure” are capitalized but not bolded (e.g. Table 1, Figure 2). The word “figure” is not abbreviated (e.g., Figure 1, not Fig. 1).
- 1(d) Tables and figures may be mentioned in running prose or placed in parentheses somewhere in the sentence. Typically, tables and figures are referred to in present tense (e.g., “The data *are* summarized in Table 1.”). A few examples are given below.
- Gas-phase mole fractions of each component are summarized in Table 2.
 - CCR values with their compositions are given in Table 1.
 - As shown in Figure 1, the film samples can be identified as γ -Bi₂MoO₆.
 - The full production system is illustrated in Figure 3.
 - No such signals were detected in the dark (Figure 7A).
 - Models with other fields (Table 2) had lower Q^2 values.
- 2(a) Two “hits” are given below (470 documents were identified in the search, on October 3, 2007). The first excerpt suggests the minimal amount of information that should be reported: type of detector, number of scans, and resolution. The second excerpt includes additional information about the FTIR source, beam splitter(s), and spectral range. Neither article includes a sketch of the instrument; sketches are appropriate only for custom-built instrumentation, not commercially available instruments.

FTIR spectra were recorded with a Bruker Equinox 55 spectrophotometer that possessed a MCT detector. All spectra presented were an average of 128 scans at 4 cm⁻¹ resolution. (18)

The FTIR spectrometer is a Bruker Equinox 55/S equipped with two sources [Globar, mid-IR (MIR); tungsten, near IR (NIR)], two beam splitters [KBr, MIR; CaF₂, NIR], and two detectors [DTGS, MIR; TeInAs, Peltier-cooled, NIR]. Only the MIR system was used in the present research. Infrared spectra are recorded (300 scans) continuously over the range from 7000 to 600 cm⁻¹ at a resolution of 4 cm⁻¹. (19)

- 2(b) Two hits are given below (108 documents were identified, on October 3, 2007). The two hits together suggest that details such as the following are needed: column type, column dimensions, injector and transfer line temperatures, oven temperature program, carrier gas, injection volume, and split ratio (or splitless mode). Note, too, that both excerpts include subheadings to help readers locate this information.

Gas Chromatography-Mass Spectrometry. GC-EIMS analyses were performed with a Varian CP-3800 gas chromatograph equipped with a DB-5 capillary column (30 m × 0.25 mm; coating thickness = 0.25 μm) and a Varian Saturn 2000 ion trap mass detector. Analytical conditions were as follows: injector and transfer line temperatures, 220 and 240 °C, respectively; oven temperature programmed from 60 to 240 °C at 3 °C/min; carrier gas, helium, at 1 mL/min; injection of 0.2 μL (10% hexane solution); split ratio, 1:30. (20)

GC Analysis. Analyses were performed with a Varian CP-3800 gas chromatograph (Varian Inc., Palo Alto, CA) equipped with a 1177 split/splitless injector, a 30 m × 0.25 mm i.d., 0.25 μm, CP-Sil8CB capillary column (Varian), a FID detector, and Galaxie Workstation software (Varian Inc.). Desorption of the PDMS-SPME fiber was made directly into the injector port for 5 min at 250 °C in splitless mode. The injector split/splitless program mode was 0–5 min splitless; 5.01–5.75 min at 1:50 split ratio. The column oven was programmed as follows: 60 °C (1 min) to 280 °C (2 min) at 25 °C/min. The temperatures of the injector port and detector were 250 and 280 °C, respectively. Helium was used as carrier gas, and its pressure was maintained constant at 10.0 psi (1 mL/min). (21)

- 3(a) carboiimide is spelled correctly
- 3(b) *cis* and *trans* are italicized
- 3(c) *Salmonella* is capitalized and italicized

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